CLAIMS

What is Claimed is:

1. A fuel cell system comprising:

a high voltage component;

a fuel cell stack including a positive terminal and a negative terminal;

a first conductor electrically coupled to the positive terminal and the high voltage component;

a second conductor electrically coupled to the negative terminal and the high voltage component, wherein a current propagating through the first and second conductors is in opposite directions;

a magnetic field concentrator including an opening, said first and second conductors extending through the opening, wherein a current propagating through the first and second conductors generate magnetic fields that are concentrated by the magnetic field concentrator; and

a magnetic sensor positioned relative to the magnetic field concentrator, said sensor detecting the magnetic field in the magnetic field concentrator and providing a difference signal representative of the difference between the current propagating through the first conductor and the current propagating through the second conductor.

2. The system according to claim 1 further comprising an amplifier, said amplifier being responsive to the difference signal from the sensor and providing an amplified output signal indicative of the difference between the current propagating through the first conductor and the current propagating through the second conductor.

3. The system according to claim 1 wherein the sensor is a Hall effect sensor.

4. The system according to claim 3 further comprising a current source, said current source providing a current to the sensor.

5. The system according to claim 1 wherein the magnetic field concentrator is a torroid.

6. The system according to claim 5 wherein the sensor is positioned within the torroid.

7. The system according to claim 5 wherein the torroid is a ferrite torroid.

8. The system according to claim 1 wherein the high voltage component is a vehicle component.

9. The system according to claim 8 wherein the difference signal generated by the sensor represents a fault detection of an electrical isolation system.

10. A fuel cell system comprising:

a high voltage component;

a fuel cell stack including a positive terminal and a negative terminal;

a first conductor electrically coupled to the positive terminal and the high voltage component;

a second conductor electrically coupled to the negative terminal and the high voltage component, wherein a current propagating through the first and second conductors is in opposite directions and generate magnetic fields; and

a magnetic sensor positioned relative to the first and second conductors, said sensor detecting a combined magnetic field and providing a difference signal representative of the difference between the current

propagating through the first conductor and the current propagating through the second conductor, wherein the difference signal generated by the sensor represents a fault detection of an electrical isolation system.

11. The system according to claim 10 further comprising a torroid including an opening, said first and second conductors extending through the opening, said sensor being positioned within the torroid.

12. The system according to claim 10 further comprising an amplifier, said amplifier being responsive to the difference signal from the sensor and providing an amplified output signal indicative of the difference between the current propagating through the first conductor and the current propagating through the second conductor.

13. The system according to claim 10 wherein the sensor is a Hall effect sensor.

14. The system according to claim 10 wherein the high voltage component is a vehicle component.

15. A method of detecting a fault condition of an isolation system in a fuel cell system, said method comprising:

providing a high voltage component;

providing a fuel cell stack including a positive terminal and a negative terminal;

electrically coupling a first conductor to the positive terminal and the high voltage component;

electrically coupling a second conductor to the negative terminal and the high voltage component, wherein a current propagating through the first and second conductors is in opposite directions and generate magnetic fields;

detecting the magnetic fields generated by the first and second conductors; and

providing a signal representative of the difference between the current propagating through the first conductor and the current propagating through the second conductor from the detected magnetic field.

16. The method according to claim 15 wherein detecting the magnetic fields generated by the first and second conductors includes detecting the magnetic fields generated by the first and second conductors by a magnetic sensor.

17. The method according to claim 16 wherein detecting the magnetic fields generated by the first and second conductors includes detecting the magnetic fields generated by the first and second conductors by a magnetic sensor positioned within a torroid, wherein the first and second conductors extend through an opening in the torroid.

18. The method according to claim 15 wherein detecting the magnetic fields generated by the first and second conductors includes detecting the magnetic fields generated by the first and second conductors by a Hall effect sensor positioned within a torroid, wherein the first and second conductors extend through an opening in the torroid.

19. The method according to claim 15 wherein the high voltage component is a vehicle component.